

WHAT IS CLAIMED IS:

1. A method of minimizing detectability of an electronically communicated message, comprising:

establishing a nominal transmission frequency;

establishing a dwell period;

defining a predetermined frequency modulation pattern about the nominal transmission frequency, the predetermined frequency modulation pattern being suitable to vary the nominal transmission frequency during the dwell period;

dividing the dwell period into a plurality of sub-dwell periods, where each sub-dwell period has a nominal sub-frequency assigned thereto according to the predetermined frequency modulation pattern;

randomly ordering the plurality of sub-dwell periods and the respective assigned nominal sub-frequencies; and

transmitting the message according to the random ordering of the nominal sub-frequencies.

2. The method of claim 1, further including:

for each randomly ordered nominal sub-frequency, varying the nominal sub-frequency during the respective sub-dwell period by one of increasing and decreasing the nominal sub-frequency; and

transmitting the message at frequencies by which each randomly ordered nominal sub-frequency has been increased or decreased.

3. The method of claim 2, further including:

increasing a time that the transmitted frequency transitions from one randomly ordered nominal sub-frequency to a next randomly ordered nominal sub-frequency.

4. The method of claim 1, further including applying a band-limiting filter to each randomly ordered nominal sub-frequency..

5. The method of claim 1, wherein the nominal transmission frequency is one of a plurality of frequency hops of a frequency hopping strategy, and wherein the dwell period is an amount of time the frequency hopping algorithm is configured to maintain the one of the plurality of frequency hops.

6. The method of claim 1, wherein the random ordering of the nominal sub-frequencies is performed using a pseudo-random number generator.

7. The method of claim 1, wherein the predetermined frequency modulation pattern is a frequency jitter pattern that includes at least one of a frequency increase and a frequency decrease during the dwell period.

8. The method of claim 1, wherein the predetermined frequency modulation pattern is a frequency chirp characterized by one of an increase and a decrease in frequency during the dwell period.

9. A method of minimizing detectability of a message transmitted by a frequency hopping algorithm, the method comprising:

establishing a nominal frequency suitable for transmitting the message during a dwell period according to the frequency hopping algorithm;

defining a predetermined frequency modulation pattern about the nominal frequency, the predetermined frequency modulation pattern being suitable to vary the nominal frequency during the dwell period;

dividing the dwell period into a plurality of sub-dwell periods, where each sub-dwell period has a nominal sub-frequency assigned thereto according to the predetermined frequency modulation pattern;

rearranging a sequence of the plurality of sub-dwell periods and the respective assigned nominal sub-frequencies during the dwell period;

for each rearranged nominal sub-frequency, varying the nominal sub-frequency during the respective sub-dwell period by one of increasing and decreasing the nominal sub-frequency; and

transmitting the message at frequencies by which each rearranged nominal sub-frequency has been increased or decreased.

10. The method of claim 9, further including:

increasing a time that the transmitted frequency transitions from one rearranged nominal sub-frequency to a next rearranged nominal sub-frequency.

11. The method of claim 9, further including: applying a band-limiting filter to each rearranged nominal sub-frequency.

12. The method of claim 9, wherein the rearranging of the nominal sub-frequencies and the respective nominal sub-frequencies is performed using a pseudo-random number generator.

13. The method of claim 9, wherein the predetermined frequency modulation pattern is a frequency jitter pattern characterized by at least one of a frequency increase and a frequency decrease during the dwell period.

14. The method of claim 9, wherein the predetermined frequency modulation pattern is a frequency chirp characterized by one of an increase in frequency and a decrease in frequency during the dwell period.

15. A method of electronically transmitting a message, comprising:  
establishing a nominal transmission frequency;  
establishing a dwell period;  
defining a predetermined frequency modulation pattern about the nominal transmission frequency, the predetermined frequency modulation pattern being suitable to vary the nominal transmission frequency during the dwell period;  
dividing the dwell period into a plurality of sub-dwell periods, where each sub-dwell period has a nominal sub-frequency assigned thereto according to the predetermined frequency modulation pattern;  
rearranging a sequence of the plurality of sub-dwell periods and the respective assigned nominal sub-frequencies according to a pseudo-random algorithm; and  
transmitting the message according to the rearranged ordering of the nominal sub-frequencies.

16. The method of claim 15, further including:

for each randomly ordered nominal sub-frequency, varying the nominal sub-frequency during the respective sub-dwell period by one of increasing and decreasing the nominal sub-frequency; and

transmitting the message at frequencies by which each randomly ordered nominal sub-frequency has been increased or decreased.

17. The method of claim 16, further including:

increasing a time that the transmitted frequency jumps from one randomly ordered nominal sub-frequency to a next randomly ordered nominal sub-frequency, wherein the increasing is accomplished by applying a band-limiting filter to the transmitted frequency.

18. The method of claim 15, wherein the nominal transmission frequency is one of a plurality of frequency hops of a frequency hopping strategy, and wherein the dwell period is an amount of time the frequency hopping algorithm is configured to maintain the one of the plurality of frequency hops.

19. The method of claim 15, wherein the predetermined frequency modulation pattern is a frequency chirp characterized by one of an increase in frequency and a decrease in frequency during the dwell period.